Claims

1. Unit (1) for outputting a signal (CHAN) to a transmission channel (3), comprising at least two bus lines (31, 32), in a motor vehicle,
   - having a fault-tolerant coding unit (11) for converting a sensor signal (DATA) into outgoing transmission signals (TxA, TxB);
   - having at least two high-speed driver modules (12), which are connected antiparallel to one another and downstream from the coding unit (11) for connecting the output unit (1) to the transmission channel (3) and for converting the transmission signals (TxA, TxB) into the signal to be emitted (CHAN);
   - having a comparison unit (111), which permits a voltage comparison of the outgoing transmission signals (TxA, TxB) with incoming receive signals (RxA, RxB);
   - having a first coding rule for the normal operating mode of the coding unit (11) where equivalence between the voltages of TxA and RxA and/or of TxB and RxB is detected by the comparison unit (111);
   - and having a second coding rule for a special operating mode of the coding unit (11) in the event of inequivalence being detected by the comparison unit (111) between the voltages of TxA and RxA and/or of TxB and RxB, and therefore - in particular - in the event of one of the bus lines (31, 32) being externally short-circuited to GND or BAT;
   - whereby the coding rules for the outgoing transmission signals (TxA, TxB) provide a character set of at least n+1 characters (LOW, HIGH, ZERO) if the character set for the sensor signal (DATA) has n characters ("0", "1").

2. Output unit (1) according to Claim 1, in which each character ("0", "1", LOW, HIGH, ZERO, low, high) is represented by a discrete, electrical signal state, whereby, in the event of an external short circuit being detected in the transmission channel (3), the voltage of the LOW or HIGH character about to be transmitted in the transmission signal (TxA, TxB) can be changed.

3. Output unit (1) according to Claim 1 or 2, in which the character set for the sensor signal (DATA) has at least two different characters ("0", "1") and the character set for the transmission signal (TxA, TxB), the receive signal (RxA, RxB), and the signal to be emitted (CHAN), has at least three (LOW, HIGH, ZERO), preferably four, and ideally five (LOW, HIGH, ZERO, low, high) different characters.

4. Output unit (1) according to Claim 1 to 3, in which an external short circuit in the transmission channel (3) is detected at the latest after half of a signal time unit (T) has elapsed, or preferably after 40%, and ideally at the latest after 30% of the signal time unit (T) has elapsed.

5. Output unit (1) according to one of the above claims, in which the detection of an external short circuit causes the characters (LOW, HIGH) to be changed such that the character (LOW, HIGH) about to be transmitted can be switched to a different polarity at a point between 30% and 70% of the signal time unit (T), or preferably between 40% and 60%, and ideally after 50% of the signal time unit (T) has elapsed.

6. Output unit (1) according to one of the above claims, in which the second coding rule is formed such that
   - in the event of the external short-circuiting of Bus_L (32) to GND, a LOW character about to be transmitted in the transmission signal (TxA, TxB) is converted into a high character with time condition;
   - in the event of the external short-circuiting of Bus_L (32) to BAT, a HIGH character about to be transmitted in the transmission signal (TxA, TxB) is converted into a low character with time condition;
   - in the event of the external short-circuiting of Bus_H (31) to GND, a HIGH character about to be transmitted in the transmission signal (TxA, TxB) is converted into a low character with time condition;
   - in the event of the external short-circuiting of Bus_H (31) to BAT, a LOW character about to be transmitted in the transmission signal (TxA, TxB) is converted into a high character with time condition; and
   - a recessive ZERO character is transmitted as a ZERO character in each of the aforementioned short-circuit cases.

7. Output unit (1) according to one of the above claims, in which at least the first coding rule provides, for the signal time unit of the sensor signal (DATA) that is occupied with a character, a signal time unit with the same duration (T) in the transmission signal (TxA, TxB), the receive signal (RxA, RxB), and the signal to be emitted (CHAN).

8. Output unit (1) according to one of the above claims, in which the two coding rules provide different characters for two consecutive signal time units (T) in

the transmission signal (TxA, TxB).

9. Output unit (1) according to one of the above claims, in which the first coding rule is formed such that
   - a "0" character in the sensor signal (DATA) is always coded as a LOW character or a HIGH character in the transmission signal (TxA, TxB);
   - a "1" character in the sensor signal (DATA) is always coded as a HIGH character or a LOW character in the transmission signal (TxA, TxB);
   - a "0" character following another "0" character in the sensor signal (DATA) is coded as a ZERO character in the transmission signal (TxA, TxB), unless the preceding character in the transmission signal (TxA, TxB) was already a ZERO character;
   - a "1" character following another "1" character in the sensor signal (DATA) is coded as a ZERO character in the transmission signal (TxA, TxB), unless the preceding character in the transmission signal (TxA, TxB) was already a ZERO character; and
   - coding is effected according to the basic coding rules if the preceding character in the transmission signal (TxA, TxB) was a ZERO character.

10. Unit (2) for receiving a signal (CHAN) from a transmission channel (3), comprising at least two bus lines (31, 32), in a motor vehicle,
   - having a decoding unit (21) for converting incoming receive signals (RxA, RxB) into an operating signal (DATA);
   - having at least two high-speed driver modules (12), which are connected antiparallel to one another and upstream from the decoding unit (21), for connecting the receiver unit (2) to the transmission channel (3)

and for converting the signal to be received (CHAN) into incoming receive signals (RxA, RxB);

- having a detection unit (212), which permits the detection of timing pulse edges from the incoming receive signals (RxA, RxB);
- having a first decoding rule for the normal operating mode of the decoding unit (21), where synchronism of the timing pulse edges is detected by the detection unit (212) for a defined signal time unit (T);
- having a second decoding rule for a special operating mode of the decoding unit (21), where asynchronism of the timing pulse edges is detected by the detection unit (212) for a signal time unit (T);
- whereby the decoding rules for the operating signal (DATA) provide a character set of n characters ("0", "1") if the character set for the incoming receive signals (RxA, RxB) have at least n+1 characters (LOW, HIGH, ZERO).

11. Receiver unit (2) according to Claim 10, in which each character ("0","1", LOW, HIGH, ZERO, low, high) is represented by a discrete, electrical signal state.

12. Receiver unit (2) according to Claim 10 or 11, in which the character set for the operating signal (DATA) has at least two different characters ("0", "1") and the character set for the receive signal (RxA, RxB) and the signal to be received (CHAN) has at least three (LOW, HIGH, ZERO), preferably four, and ideally five different characters (LOW, HIGH, ZERO, low, high).

13. Receiver unit (2) according to one of Claims 10 to 12 in which, if the time between two occurring timing pulse

edges is less than 0.6 to 0.9 of a signal time unit (T), and - in particular - is less than 0.75 of a signal time unit (T), or is greater than 1.1 times to 1.4 times a signal time unit (T), and - in particular - is greater than 1.25 times a signal time unit (T), the character about to be decoded is interpreted under the condition of an external short circuit.

14. Receiver unit (2) according to one of Claims 10 to 13, in which the second decoding rule is formed such that
- in the event of the external short-circuiting of Bus_L (32) to GND, a converted high character with time condition is decoded into a LOW character;
- in the event of the external short-circuiting of Bus_L (32) to BAT, a converted low character with time condition is decoded into a HIGH character;
- in the event of the external short-circuiting of Bus_H (31) to GND, a converted low character with time condition is decoded into a HIGH character;
- in the event of the external short-circuiting of Bus_H (31) to BAT, a converted high character with time condition is decoded into a LOW character; and
- a recessive ZERO character is decoded as a ZERO character in each of the aforementioned short-circuit cases.

15. Receiver unit (2) according to one of Claims 10 to 14, in which at least the first decoding rule provides, for the signal time unit of the receive signal (RxA, RxB) and of the signal to be received (CHAN), a signal time unit with the same duration (T) in the operating signal (DATA).

16. Receiver unit (2) according to one of Claims 10 to 15,

in which the first decoding rule is formed such that

- a LOW character in the receive signal (RxA, RxB) is always decoded into a "0" character or a "1" character in the operating signal (DATA),
- a HIGH character in the receive signal (RxA, RxB) is always decoded into a "1" character or a "0" character in the operating signal (DATA),
- the character in the operating signal DATA, that is recovered from a ZERO character in the receive signal (RxA, RxB), is identical to the preceding character ("0" or "1") of the operating signal DATA.

17. Receiver unit (2) according to one of Claims 10 to 16, having a unit (211) for recovering a clock signal (STROBE) from the incoming receive signals (RxA, RxB).

18. System (4) for transmitting data in a motor vehicle via a transmission channel (3), comprising at least two bus lines (31, 32),

- having an output unit (1) according to one of Claims 1 to 9; and
- having a receiver unit (2) according to one of Claims 10 to 17.

19. Method for transmitting data in a motor vehicle, in which

- a sensor signal (DATA) is coded, by means of an output unit (1) according to one of Claims 1 to 9, into a signal to be transmitted (CHAN);
- in which signals formed in this way (CHAN) are transmitted to a receiver unit (2).

20. Method for receiving data in a motor vehicle, in which a signal to be received (CHAN), in particular a signal formed according to Claim 19, is decoded into an

operating signal (DATA) by means of a receiver unit (2) according to one of Claims 10 to 17.